

## Effect of Case-Based Learning Approach on Technical Nursing Students' Knowledge about Applying Evidence-Based Practice



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### 1. ABSTRACT

**Background:** Evidence-Based Practice (EBP) implementation is the future challenge of health care services. Case-Based Learning (CBL) is an efficient teaching method that is known to be a more general class of inquiry and discovery learning. CBL generally involves public scenarios aligned with defined learning outcomes that possess an educational value that stimulates interest, produces empathy with the characters, and typically has general applicability. **Aim:** To investigate the effect of implementing CBL on developing EBP knowledge among students in Technical Institutes of Nursing. **Method:** A quasi-experimental study design was conducted among (66) technical nursing students who attended the community health nursing course in the second year. **Results:** The findings showed a statistically significant increase in nursing students' knowledge with a mean of  $23.35 \pm 2.95$  marks and  $27.21 \pm 2.08$  marks immediately post and after two months of CBL sessions' implementation; respectively. Students' knowledge was increased in EBP steps related to asking answerable, acquiring research, and appraising research. **Conclusion:** Applying the CBL as an educational method was highly influential in improving the students' level of knowledge regarding EBP.

**Keywords:** Nursing student; Evidence-Based Practice; Case-Based Learning

### 2. Introduction:

Evidence-based practice (EBP) is a technique for managing clinical problems and decisions making about interventions. It is recognized as a combination of three elements based on the best scientific research combined with clinical expertise included with patient's preferences in the providing of competent patient care (Orton, Nilsen, Nelson Follin, & Dannapfel, 2020). EBP is a way for the nursing profession to close the theory-to-practice gap (Marlowe, Cannata, Bertram, Choi, & Kerns, 2020). The implementation of EBP in healthcare settings is presented as the main response to the future challenges of health care services (Li, Jeffs, Barwick, & Stevens, 2018).

In Egypt, the technical nursing institutes are representing a key channel for providing nursing workforces of second-level nurses. The authorized Egyptian organizations are executing efforts for improving technical nursing education. Therefore, the technical nursing curriculum was upgraded to be a competency-based curriculum, which includes EBP as one of nursing competencies (Brownie, Docherty, Al-Yateem, Gadallah, & Rossiter, 2018).

Nursing education is facing challenges in teaching EBP. Among these challenges is the extra effort that is required to teach EBP and applying it to nursing activities (Aglen, 2016). Undoubtedly

interactive learning facilitates the acquiring of EBP knowledge and skills (Horntvedt, Nordsteien, Fermann, & Severinsson 2018). One of the interactive learning strategies is "Case-Based Learning (CBL)", which is known to be a more general discovery learning class. It frequently comprises common scenarios aligned with clear learning outcomes that have an educational value that arouses interest, generates empathy with the characters, and typically have general applicability. (Mahmood, Syed, Khan, Batool & Rehman, 2017). CBL is a student's learner- centered approach, in which the instructor facilitates the learning environment that help students to address the illustrated problems in the learning scenarios collaboratively Using a CBL approach engages students in a discussion of specific situations, typically real-world examples. (Ktoridou, Doukanari, Epaminonda & Karayiannis, 2018, Bi, Zhao, Yang & Wang, 2019).

Therefore, this study is conducted to investigate the effect of using CBL on developing EBP knowledge among students in Technical Institutes of Nursing.

### Study hypothesis

1. Using the CBL model will not improve the knowledge of technical nursing students about the EBP approach.
2. Using the CBL model will improve the knowledge of technical nursing students about the EBP approach.

### 3. Method

#### 3.1. Study design

Quasi-experimental post-test only study design was used to accomplish this study

#### 3.2. Sample:

The study was carried out at the Sherbin-Technical Institute of Nursing. A convenience sample technique was used to recruit 66 nursing students who have been attending the community health nursing course in the second year by considering dropouts by adding 10% is 66. The sample size was calculated according to (Rosner, 2015). By assuming a power of 80% at 95% confidence level, and by hypothetical, that mean of students competency in EBP at two times - periods the first was  $3.06 \pm 2.01$  immediately after attending training on EBP and  $4.11 \pm 0.4$  at follow up after 2 months. This estimation is based on the results of María Ruzafa-Martínez, Molina-Salas, and Ramos-Morcillo (2015).

#### 3.3. Study tools:

The study was conducted during the second semester of the academic year 2019/2020. Two tools for data collection were designed by the researcher.

**Demographic and educational characteristics assessment questionnaire** was used to assess students' demographic and educational characteristics including data such as sex, age, educational level.

**Self-administered structured questionnaire** was used to assess the students' knowledge of evidence-based practice, including the concept and definition of evidence-based practice (EBP), as well as the steps of applying EBP which include formulating the clinical question, searching strategies for finding the best available evidence, and critically appraising the evidence. (Al-Baghli, 2013; Faridhosseini et al., 2016; Zaky, 2012).

The questions were classified into three categories; all of these categories were composed of 32 questions. Each question was scored as one mark for the correct answer and zero for the wrong answer. The knowledge' questions were included

20 questions for asking an answerable question category, six questions for acquiring research category, and six questions for appraising research category.

The total knowledge score was categorized into three levels. Poor level for scores less than 50% of total scores (<16 marks). Fair level for scores ranged from 50% to < 75% of total scores (16 to less than 24 marks) and good level for scores  $\geq 75\%$  of total scores (24 marks and more).

#### 3.4. Study Implementation Process

##### Planning and Implementation of CBL Sessions: Case preparation

Cases were developed by the researcher according to the community health nursing curriculum based on the school health and maternal and child health (MCH) area. During sessions, the students are required to read the case carefully and identify the problem to design a nursing care plan based on the EBP process.

The CBL sessions were scheduled at a time that was not conflicted with the other student's tasks. Details about CBL sessions included the date; time, place, topics, and duration of each session were distributed among nursing students before the meeting.

The sessions were introduced to sixty-six nursing students with prior or little knowledge of EBP and its principles as a series of eight sessions. Each session was held for two hours in the computer laboratory of the institute to allowed students to work on computers with an internet connection.

Students were divided into small groups; each group was composed of 9-10 students. One facilitator was assigned from each group to collaborate in distributing the activities among the group. Time was set aside after each session for the group to reflect, consider how they would apply the new skills and knowledge in their daily practice. There was also an opportunity for the students to ask questions and review. Illustrated handout about EBP was distributed after implementing each CBL session as a reference.

Before starting the first session, the researcher explained the purpose of the sessions to the students. Then, the researcher distributed the demographic questionnaires among the students to gather information about their personal data and explore if they have previous information about the EBP approach. CBL

In the first session, the researcher explained all issues about CBL sessions and then gave an

introductory PowerPoint presentation about the concept of EBP, its benefits, steps, and how to use it in clinical practice, which took about 30 minutes. After that, a discussion was made about how to use the EBP approach in clinical practice, in addition to recognizing situations that impose clinical uncertainty, and whether their information needs to constitute background or foreground questions.

#### **Case analysis and application of EBP process**

The tutor started to present a case scenario with a discussion on how to formulate an answerable question using the PICOT format (P: population or patient; I: intervention; C: a comparison; O: outcome; T: time) in the second session. They were learned that EBP skills help answer foreground questions and derive highly specific clinical questions from clinical problems including questions about therapy and etiology. After that, the researcher was asked the student facilitator to distribute different pre-structured clinical scenarios to each group.

Each group started to work on his scenario by reading the case carefully and then analyzing the case, state the objectives, find the problem, and then framing a focused, answerable question in a structured five-part format (patient-intervention/exposure-comparator-outcome-time).

Student started brainstorming about their findings in written and oral framework and then discuss them with the other groups. The researcher control over the session during the discussion and with the facilitators moved from group to group to monitor student progress, facilitate discussion, evaluate the performance and provide suggestions if a group experienced difficulty.

Accordingly, the tutor presented the questions that were formulated in the second session then he demonstrated how to construct a spider diagram, he also illustrated the different sources of biomedical information databases, their relevance, and location such as PubMed, Cochrane Library, and Google Scholar. Furthermore, a detailed description of how to design effective search strategies for finding valid evidence was performed with a demonstration using MeSH terms, Boolean operators, keywords, and spider diagram.

The students were instructed to utilize the problem that was identified by the PICOT questions after analyzing the case and determined the learning objectives to develop successful strategies in searching for evidence in the relevant databases in written format. Next, each group

utilized the previously developed search strategies in searching for evidence in relevant databases to answer their pre-determined question.

The tutor presented a randomized controlled trial (RCT) study to instruct the students on how to appraise the internal validity, reliability, and applicability of these studies to reach a final judgment using the related standardized critical appraisal checklists (**Critical Appraisal Skills Programme. 2014**). Students were taught with a hands on how to conclude findings from the appraised studies and determine if they answer the pre-determined question with the reflection of practice, experiences, thoughts, and consideration of patients' values, preferences, and culture.

Then, each group was delivered one RCT article and its related critical appraisal worksheets to appraise them.

After appraising of the different RCTs, each member illustrated his appraisal findings in an oral and written format to the other groups, while the researcher evaluated and managed discussion within the group. In the discussion, the students were considering the nature of the problem and generate solutions for the ongoing management of the case by starting to design a nursing care plan based on the EBP process. At the end of this session, the tutor asked the students to design a PowerPoint presentation of all findings.

#### **Sharing the results**

Based on the results and data gathered from the aforementioned discussions, the most appropriate solutions to the problems were proposed via the facilitator using PowerPoint presentation. The presentation includes introduction to the patient problem, case analysis, the formulated questions, and the case learning objectives, search strategies and critical appraisal of the articles retrieved. Additionally, the presentation also includes solution of the problem based on the study findings, nursing care plan that helped in solving the problem. Finally, the teachers answered students' questions and repeated any points that had not been fully understood. Finally, the tutor explained strategies to apply the evidence-based findings in a real situation.

#### **Evaluating the CBL sessions**

Retained knowledge about EBP was assessed immediately after implementing CBL sessions and after two months.

### 3.5. Data analysis

After the data were collected, it was sorted, coded, organized, categorized, and transported to specially developed formats that would be appropriate for computer feeding. Statistical analyses are carried out using the SPSS statistical program (Stands for Statistical Product and Service Solutions) version 21. Categorical variables were described using number and percent. Continuous variables were presented as mean± SD (standard deviation). Paired sample t-test was used to compare means of indifferent follow-up durations. A statistical test with a p-value <0.05 was considered statistically significant.

### 3.6. Ethical Issues

Before conducting the study, ethical approval was obtained from the research ethics committee of the faculty of Nursing, Mansoura University. Additionally, official permission from the dean of the Sherbin-Technical Institute of Nursing was obtained after clarifying the purpose of the study. The student's oral permission was obtained after clarifying the intent of the research and ensuring the confidentiality of the information.

Finally, ethical considerations were maintained through the anonymity and confidentiality of the collected data.

## 4. Result

**Table 1** shows the demographic and educational characteristics of the studied nursing students. Results showed that 93.9% of them aged less than 21 years old, 71.2% were female, and 89.4% had no information about EBP. Also, 95.5% of them had no prior training sessions in EBP or research methodology. And those who attended training sessions attended about acquiring research.

**Table 2** shows the mean difference between the knowledge categories and total knowledge of the EBP approach immediately post and after two months of follow-up of the implementation of CBL sessions. The results revealed significant differences ( $P \leq 0.05$ ) between immediately post and after two months of follow-up of CBL sessions implementation. The total knowledge score was increased by (16.5%) after the completion of the CBL sessions.

Data	N(66)	%
Age		
<21 years	62	93.9
≥21 years	4	6.1
$\bar{x} \pm SD$		20.02±0.90
Sex		
Male	19	28.8
Female	47	71.2
working in a hospital as a Nurse's Aide		
Yes	33	50
No	33	50
Educational data		
Having information about Evidence-Based Practice		
Yes	7	10.6
No	59	89.4
Number of prior training sessions in evidence-based practice		
None	63	95.5
Once	3	4.5
Number of prior training sessions in Research methodology		
None	63	95.5
Once	3	4.5
The topic of the training sessions		
Acquiring research	2	3

Knowledge Categories	Maximum allowed score	Immediate Post-session $\bar{x} \pm SD$	Post-test after 2 months $\bar{x} \pm SD$	% of change	Paired t-test	p-value *
Asking answerable Questions	20 marks	15.18±1.921	17.45±1.531	14.9%	8.467	.000**
Acquiring Research	6 marks	4.06±0.820	4.67±0.847	15%	4.445	.000**
Appraising Research	6 marks	4.11±0.844	5.09±0.739	23.8%	7.168	.000**
Total knowledge score	32 marks	23.35±2.959	27.21±2.087	16.5%	9.720	.000**

T: Paired sample t-test. P: Significance. \*\* Significant ( $p \leq 0.05$ ).

## **5. Discussion**

Nursing is one of the most important occupations within the health care workforce. Nowadays it is essential to deliver effective patient care in the context of a rapidly growing and changing body of professional knowledge, and an increasingly complex healthcare environment (Schober, 2016).

Given the complexity and the pace of today's healthcare environment, nurse educators are increasingly challenged to ensure that nursing graduates have the requisite knowledge, skills, and attitudes for competent patient care, as well as the capability of adapting to change, generating new knowledge, and critically reflecting on and improving their practice (Bayham, & Fenichel, 2020; Institute of Medicine, 2011).

The standards for accreditation for nursing programs have in common expectation that nursing graduates will be capable of information-seeking, critical appraisal, and knowledge management skills that are necessary for effective EBP and foundational to being a lifelong learner. Lifelong learning is used to be tagged to the broad area of professional growth. Introducing evidence-based practice (EBP) in nursing education curricula is of paramount significance for students' future clinical practice (Meyer et al., 2014; Morris, Otto & Golemboski, 2013; Wept, 2011).

A wide variety of teaching approaches have been noted in EBP education and in developing communities of practice (Horntvedt et al., 2018). While traditional lecture-based educational models are effective in building the competence of graduates, there is less evidence that such ways of learning facilitate graduates' capability to function effectively in an ever-changing, complex clinical environment (Institute of Medicine, 2011).

Teaching methods that increase student motivation and enhance learning have evolved throughout history. However, the introduction of an interactive student-centered approach prepares graduates to be capable of the active, contextual, nonlinear, and transformative learning necessary to today's dynamic clinician (Lennon, Phelan, Wallace, King, & Barrett, 2019; Mandeville, Ho, & Valdez, 2017; Price, Carroll, O'Donovan, & Rust, 2011; Tayem, 2013).

Case-Based Learning (CBL) is an educational method that is an innovative and interactive, student-centered approach (Ma et al., 2016; Tayem, 2013). The linkage of theory and practice is a common aim of CBL, as it helps in the

development of clinical reasoning in medical programs (Turk, Ertl, Wong, Wadowski, & Löffler-Stastka, 2019). The main goal of this study was to investigate the effect of using CBL on developing EBP skills among students in technical institutes of nursing

Concerning the impact of CBL on the nursing student's knowledge, the results of this study included a significant improvement in nursing students' overall evidence-based practice. The results revealed significant improvement in EBP knowledge between nursing students immediately post and within two months after CBL session implementation. The finding revealed that more than two-thirds of the nursing students showed a good level of knowledge with a mean of 23.35 (2.96) marks immediately post CBL session concerning asking answerable and searchable questions, acquiring research, and appraising research. However, most of them showed a good score level of knowledge with a mean of 27.21±2.087 marks after two months after implementation of CBL sessions.

The improvement in students' knowledge after the implementation of CBL could be interpreted due to the collaboration and inquiry used in CBL, which serve in helping students cultivate problem-solving abilities, metacognitive skills, engagement in learning, and more intrinsic motivation. A CBL approach allowed greater emphasis on research processes, and the real - world problems allowed students to undertake an active, research-oriented role, developing inquiry - based skills and techniques in the process.

Case-based learning was found to be practiced worldwide by various practitioners in various fields. Similar results were found by other studies. The study conducted to assess the effectiveness of interactive CBL on nursing student's EBP knowledge reported that interactive CBL provides learners an opportunity to apply their knowledge, along with evidence-based guidelines, and promotes learning in an independent, nonlinear manner that allows for independent decision making, immediate feedback, self-reflection, and consultation with faculty and clinical preceptors (Ridgway, Sennett, Vasquez, & McClure, 2021).

Additionally, the study reported by Alhazmi and Quadri compares the effectiveness of knowledge delivery between CBL and Lecture Based Learning (LBL) strategies on dental students. It was concluded that, overall positive response from the students confirms that CBL is an

effective and acceptable teaching strategy in comparison to traditional LBL among undergraduate dental students (Alhazmi & Quadri, 2020).

Moreover, similar results are found in a study conducted to investigate the impact of a Case-Based Collaborative Learning (CBCL) curriculum covering complex medical dermatology topics on resident knowledge and learning preferences. The study concluded that resident's knowledge improved significantly after CBCL curriculum delivery. Most resident learners viewed the curriculum as worthwhile and preferred it to traditional LBL (Said, Thompson, Foord, & Chen, 2020). In addition, Kumar, & Gadbury - Amyot, (2012) studied the effect of case - based and team - based learning models to assess the knowledge in students in fourth and final year dental school. It was reported that the majority of students felt that case-based instruction helped their students increase their knowledge and learn course contents more comprehensively.

## 6. Conclusion

The study indicated that CBL is associated with significant improvements in EBP profile domains of knowledge among technical nursing students. A CBL approach can be considered viable, collaborative, and worthy of wide use. It could be applied in multilevel nursing education to develop the nursing student's knowledge in the EBP approach.

## 7. Recommendations

Based on the findings and conclusions drawn from the study, the following recommendations are made: -

1. Case based learning should be considered in nursing, in preference to traditional teaching strategies, in order to make the EBP-course more attractive and palatable.
2. It's of a great importance to train nurse educators with respect to the philosophical background, theoretical base and practical usage of CBL through orientation seminars and workshops.
3. Proper planning of students and teachers' time, space, and efforts should be considered for successful implementation of CBL that would prime the nursing students for clinical practice.

## 8. Acknowledgment

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